

Texas Space Grant Consortium (TSGC)

University of Texas at Austin

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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Texas Space Grant Designated Program was funded at a level of \$575,000 for fiscal year 2013.

PROGRAM GOALS

The TSGC strategic goals align with NASA's Educational Outcomes. Our goals and programs serve multiple constituencies with emphases on customer focus, NASA-related content, the STEM (Science, Technology, Engineering and Math) pipeline, increased diversity, effective evaluation of programs, the development of partnerships, and program sustainability. NASA's Educational Outcomes and how TSGC's goals support them are summarized below.

NASA Outcome 1

Contribute to the development of the STEM workforce (Employ and Educate)

TSGC Goal A: Increase and Enhance Minority / Underserved Participation in our programs:

TSGC has a primary focus on increasing the number of minorities and females in its programs and increase quantity and quality of underrepresented minorities and females participating in our programs. In 2013-2014, we had 68 directly funded students in our Fellowship/Scholarship category, (30 females and 38 male) 44 % were female. Our female percentage is much higher than 2012-2013 (24%). Out of our 68 directly funded students 35 were underrepresented minorities, (51%) which is an increase from 2012-2013 (41.9%).

The TSGC STEM high school intern program provides youth the opportunity analyze NASA satellite data while learning about career opportunities and college STEM majors. In this program, 40% of the participants were female and 50% were minority.

Texas Space Grant also supported the Rio Grande Valley Science Association's (RGVSA) Summer of Innovation (Sol) program by providing three of the four instructors for the program.

Of the 2,691 youth participating in the 2013 RGVSA SoI program, approximately 60% were female and more than 80% of the participants indicated they are Hispanic. These students are reported elsewhere in OEPM, but the Texas Space Grant participation in this effort is not reported elsewhere. We note these numbers here because of our strong participation in and support of this program but we do not count these numbers in our OEPM data tables.

TSGC Goal B: *Fellowship, Scholarships and Longitudinal Tracking*: We have successfully tracked 100% of our students for 2013. On average, since 2006 we have been able to track 88% of our awardees. 82% of students significantly supported by went onto next steps in STEM disciplines.

TSGC Goal C: *Workforce Development and + Higher Education*: Our ongoing *Design Challenge* matches design problems suggested by NASA JSC engineering personnel with capstone engineering design classes at our affiliates. During Spring 2013/Fall 2013, seven design teams and about 50 space professionals (JSC mentors, topic providers, judges) were involved in this program. NASA JSC provided a list of potential research topics that were circulated to all affiliate representatives. We sent additional information that gave details about program awards, stating that preference would be given to minorities and women. Affiliate representatives were tasked with advertising the awards on their campuses. We also provided information on the program to the minority and women student organizations in Texas.

TSGC Goal D: *Research Infrastructure*: (TSGC New Investigator Program). We competitively award research initiation grants to assist new faculty members / researchers at our affiliates in the initiation of research aligned with NASA's strategic plan. We awarded two \$10K grants in 2013. Details are given later in this report.

NASA Outcome 2

Attract and retain students and teachers in STEM disciplines (Educate and Engage)

TSGC Goal E: *Precollege and K-12*: Our efforts in this area focus primarily on Texas educators, and through them, their students. Our strategy focuses on enhancing K-12 educator knowledge in STEM disciplines and increasing underrepresented and underserved participation. We continue to offer the TSGC *LiftOff* summer program for teachers in conjunction with NASA JSC. Because of the success and reputation of *LiftOff*, JSC merged its Middle School Aerospace Scholars program with *LiftOff* in summer 2013. This funded ten Texas middle school teachers with priority given to those teaching in underrepresented areas of the state to underserved populations, which offset the ten previously funded through augmentation monies. This allowed numbers to remain constant at the 50 teachers normally selected for the *LiftOff* program.

In another program, TSGC conducted *Family Science Nights* in the Rio Grande Valley to help promote the 2013 NASA RGVSA SoI program mentioned earlier in this report (Under TSGC Goal A). All students interested in participating in SoI camps in summer 2013 and a family member were invited to participate. The activity featured hands-on STEM activities provided an opportunity for parents to enroll their students in the summer 2013 NASA RGVSA SoI program. Fifty four teachers conducted activities for 1900 attendees during *Family Science Nights* in the Rio Grande Valley.

NASA Outcome 3
**Build strategic partnerships and linkages between STEM formal
and informal education providers (Engage and Inspire)**

TSGC Goal F: *General public, informal education and public awareness:* In this area, we leverage our contributions by adding speakers and resources to existing STEM education programs offered by other organizations. As examples of this effort, the TSGC Outreach Coordinator and graduate students conducted training for youth serving institutions such as 4-H and Boys and Girls Clubs, implemented a space camp for visually impaired students, had exhibits at the Earth Science Week Career Fair, held outreach events at the Bob Bullock Texas State History Museum, and judged area contests such as Science Fairs.

TSGC Goal G: *Internal management:* We continue to focus on management efficiency and effectiveness in all of our activities. We are currently updating our strategic plan to assure clear alignment with NASA strategic goals. As an example of increased management efficiency, we have only one face-to-face affiliate meeting and one face-to-face board meeting a year to reduce travel costs. Travel costs for affiliate representatives in Texas are substantial and local funding to support meetings has been increasingly difficult for affiliate representatives to obtain. To offset the negative aspects of eliminating face-to-face meetings, we have increased our usage of email, teleconferencing, and web-conferencing. We conducted a segmented TSGC web conference in spring 2013, meeting with small groups of affiliate representatives each time – at times that matched their availability (3 web meetings were held).

PROGRAM/PROJECT BENEFIT TO OUTCOME (1, 2, OR 3)

NASA Outcome 1
Contribute to the development of the STEM workforce (Employ and Educate)

As stated earlier, we directly funded 68 students in our Fellowship/Scholarship category. (44% female, 51% underrepresented minorities) To demonstrate the impact of the Fellowship and Scholarship programs, we provide quotes from 2013 awardees.

“Participation in the Texas Space Grant Consortium has allowed me to explore my research interests in the field of Biomedical Engineering through various research experiences. I have also applied to various NASA internship programs, one being through the National Space Biomedical Research Institute. These experiences have expanded my choices for a future career in STEM fields, including those related to Aero/Space.” (Tessy Lal, 2013 STEM Scholarship University of Houston)

“Participating in the TSGC design challenge was, without qualification, the most difficult, most rewarding, most edifying experience of my life. I learned not just the particulars of my project, but how to manage my time, doing meaningful scientific research, and how to manifest something out of my imagination into glorious physical reality. Furthermore, participation in

this program allowed me the opportunity, again through TSGC, to complete an internship NASA's Johnson Space Center.” (Michael Gouge, Design Challenge Scholarship-U of Texas San Antonio)

NASA Outcome 2

Attract and retain students and teachers in STEM disciplines (Educate and Engage)

TSGC’s flagship K-12 program focuses on teacher education to use the leverage of excited teachers to help fill the STEM pipeline. Since 1990, TSGC has conducted an annual weeklong summer teacher workshop, *LiftOff*, at NASA JSC. Below is a highlighted quote from a *LiftOff* educator who attended in summer 2013.

“This was a wonderful experience both in the information we learned and method of providing information. I think breaking up the presenters each day with some activity or field trip helps us stay on track and motivated. Visiting with astronauts was so exciting and motivating and I really enjoyed the space suit information. I enjoyed meeting teachers from across the country, networking ideas is a plus in this age of teaching. Thank you for the variety of talent which you brought to the sessions. The worst part was the end. The activities and speaker topics will fit directly into the subjects and content I teach! Thank you for an awesome week!” Jayne Doxey, Kileen ISD.

NASA Outcome 3

Build strategic partnerships and linkages between STEM formal and informal education providers (Engage and Inspire)

A good example of successful measurable outcomes comes from the previously mentioned TSGC partnership with the Rio Grande Science Association in the 2013 NASA RGVSA SoI program. Subsequent to the 2013 SoI program, TSGC partnered with the RGVSA in obtaining additional funding through the Albert I. Pierce Foundation for teacher professional development and student materials. The funding was used to train staff members of the *Boys and Girls Clubs* in the Rio Grande Valley who implemented SoI type activities in their summer programs.

The *LiftOff* program gives priority to teachers who reach underrepresented and underserved audiences. In follow-up evaluations, 40% of those attending report their students are 80% minority and over 90% on free or reduced lunch. These educators used *LiftOff* materials with over 2,400 students in their respective schools.

PROGRAM ACCOMPLISHMENTS TO OUTCOME 1, 2, 3

Outcome 1 - NASA Outcome 1

Contribute to the development of the STEM workforce (Employ and Educate)

TSGC Goal B - *Fellowship and Scholarships and Longitudinal Tracking*: TSGC annually awards 20 to 25 \$5000 graduate fellowships, 20 to 30 \$1500 Columbia Crew Memorial STEM undergraduate scholarships, and 10 to 20 Design Challenge Scholarships. A three person committee (two members are affiliate representatives from MSIs) selects the recipients each year. In 2013, we received 147 complete online applications (plus over 200 other partially completed applications) and awarded 30 Scholarships (16 females, 14 males) (19 minorities, 2 Asian, 9 Caucasian), 20 Fellowships (6 females, 14 males) (5 minorities, 1 Asian, 1 Pacific Islander, and 13 Caucasian). We also awarded 18 *Design Challenge* Academic Scholarships (10 males, 8 females, (11 Minorities, 4 Asians, 1 pacific Islander, 2 Caucasian) and we sponsored 1 NASA Academy student (1 male, Caucasian). Eleven additional students received team funding through the *Design Challenge* (9 males, 2 females) (3 African Americans, 5 Asians, 2 Caucasian, 1 Hispanic).

Fellowship and Scholarships and Longitudinal Tracking: We track students funded in previous years. 61 students took next step in FY13 (SG participation supported from FY06-FY13 funds) (82% of students significantly supported by went onto next steps in STEM disciplines.)

- 8 are pursuing advanced degrees in STEM disciplines
- 5 are seeking STEM positions
- 9 accepted STEM positions at NASA contractors
- 12 accepted STEM positions in industry
- 3 accepted positions at NASA
- 1 accepted STEM positions in K-12 academia
- 5 accepted STEM positions in academia
- 18 went on to positions in non-STEM disciplines

TSGC Goal C- *Workforce Development and Higher Education*: Our *Design Challenge* matches undergraduate student design teams from TSGC affiliates with NASA mentors and real-world space-related design projects. Since 2002, the program has supported NASA mission-related research activities through 226 student design team projects. In addition to the student designs, the program has resulted in the development of interdisciplinary space-related courses at both introductory and advanced levels. During FY 2013-2014, 7 teams at 5 TSGC affiliates participated in the *Design Challenge* and two affiliate institutions developed courses that directly incorporated the *Design Challenge* into their degree plans. During FY 2013-2014, 33 students participated in the program (10 females, 23 males) (17 minorities, 4 Caucasian, 11 Asian, 1 Pacific Islander) (51% minority participation). Affiliates that participated in the 2013 program were:

- Lamar University *Team Astro Cardinals* and *Team Gliese*
- Rice University, *Team Rice Hermes*,
- Texas A&M Kingsville, *Team TAMUK Design*, Senior Design I, Course MEEN 4263
- San Jacinto, *Team Ju-Pollo6*,
- University of North Texas, *Team The Wifiers*, Course Direct Study on wireless and network, CSCE 4900 and *Team Titans*,

TSGC Goal C - Higher Education Proposal Opportunities: We competitively award new higher education projects to faculty and staff members at our affiliates at a \$15K level matched with \$15K from their home institutions. In 2013-2014, we awarded two new projects:

- University of Houston (MSI) STEM Center, *“The Mars Rover Model Celebration: Enhancing Formal and Informal STEM Education in Grades 3-8 and Improving Teacher Training Using the Excitement of NASA’s Latest Mars Missions”* PI: former Astronaut Dr. Bonnie Dunbar (1 Female Caucasian)
- University of Texas at San Antonio, (MSI) *“Development of a New Course on Engineering Applications of NASA observing Technology”* PI: Dr. Hatim Sharif (1 Male, other)

TSGC Goal D - Research / New Investigator Program: TSGC provides research start-up funding of \$10K, matched by the recipient’s home institution, to two to five new faculty each year. These funds are awarded competitively to young investigators starting space-related research programs. In 2013-2014, three new Research grants were awarded:

- University of North Texas, *“Spray Cooling: An Advanced Thermal Management Technique for Space Applications”* PI: Dr. Huseyin Bostanci (1 Male, other)
- University of Texas at Arlington, *“Observing Near Space Using Samara-shaped Reentry Vehicles”* PI: Dr. Robert Ben Harris (1 Male, Caucasian)
- Southern Methodist University, *“Search for and Study of Supernovae and Gamma-ray Bursts”* PI: Dr. Robert Kehoe, (1 Male, Caucasian)

NASA Outcome 2

Attract and Retain students and teachers in STEM disciplines (Educate and Engage)

TSGC Goal E - K-12 Education Program: TSGC’s K-12 program focuses on teacher education to leverage the excitement of teachers to help fill the STEM pipeline. Since 1990, TSGC has conducted an annual weeklong summer teacher workshop, *LiftOff*, at NASA JSC. *LiftOff* emphasizes STEM learning experiences by incorporating a space science theme supported by NASA missions. Teacher participants are provided with information, materials, and experiences through hands-on activities and field trips. The theme for *LiftOff 2013* was *“Rockets to Robots”*. 50 teachers attended the weeklong workshop. Of the total, 40 were female and 10 male, (13 minorities: 9 Hispanic, 3 African American, 1 Asian and 37 Caucasian) (25% minority,

80% female). The teacher features (sharing of lesson plans among educator participants) and opportunities to interact with scientists and engineers dedicated to space missions are highlights for the educators attending. In addition to the *LiftOff* summer program at JSC, *LiftOff Alumni Teachers* conduct space-related training sessions which reach approximately 2,500 Texas teachers annually.

TSGC Goal E - K-12 Education Grants: TSGC provides K-12 Education grants matched by the recipient's home institution, to two to five affiliate faculty each year. These funds are awarded competitively. In 2013, we awarded two K-12 projects at \$15K each.

- University of Texas at Austin “*M is for Math...in STEM*”, PI: Dr. Judit Ries (1 Female, Caucasian)
- University of Texas El Paso (MSI), “*Equality in STEM: the Disabled and Females in the Future Workforce*”, PI: Dr. Nate Robinson (1 Male, Caucasian)

TSGC Goal E - Teacher professional development short term activities: As a result of TSGC's history of activities in STEM education, we are often contacted to conduct STEM training activities for teachers. During the 2013-2014, we conducted workshops at The National Science Teacher Association (NSTA) meeting, led workshops on NASA Wavelength for the Science Mission Directorate, conducted teacher development activities at the Conference for the Advancement of Science Teachers (CAST), the Space Exploration Educator Conference, Rio Grande Valley Science Association, Gidden Elementary School, and Texas Regional Collaborative for Science and Math. TSGC Outreach staff conducted professional development to 450 educators who implemented programs with over 5,000 youth.

NASA Outcome 3

Build strategic partnerships and linkages between STEM formal and informal education providers (Engage and Inspire)

TSGC Goal F – Informal Education: Our goal in this area is to promote STEM education, increase public awareness of STEM initiatives and demonstrate program successes. We continue to collect “Success Stories” to highlight the activities and accomplishments of students and teachers that have participated in our programs. We have collected over 100 success stories to date. We maintain an extensive website (www.tsgc.utexas.edu) and a TSGC fan Facebook page (http://www.facebook.com/pages/NASA-Texas-Space_Grant/286095539201?v=wall) with over 1,050 fans to date. TSGC continues to host the “Ask-A-Scientist” link on the consortium website which answers space-related questions provided by teachers, students, and the general public. Questions come in daily. We provide interesting and engaging interactive educational space related experiences through the TSGC website and newsletter “*Voyage to Spread Space Excitement*” reaching over 1,500 individuals. Our flagship K-12 program, the *LiftOff* Summer Institute continues to impact teachers all over the state and nation. Teachers are now sharing their expertise at area Science Nights, Career Days, and Regional and State Conferences. In addition,

TSGC has taken the lead in connecting informal education organizations, such as the *Boys and Girls Clubs* and 4-H, leveraging activities developed supporting the *Summer of Innovation Program*.

Outcome 3 – TSGC Goal G - *Management and Infrastructure*: We continue to seek ways to manage our program activities more efficiently. We review our strategic plan annually, seek external support, require matching from affiliates on most of our programs, and augment activities initiated by other groups whenever possible. We leverage programs wherever possible.

Student outreach STEM initiatives: TSGC collaborated with the University of Texas Center for Space Research to sponsor the *NASA ROSES Summer Internship* program for high school students. This competitive program offered 11 high school students the opportunity to work beside scientists and engineers in a university setting. The program involved climate education and analysis of satellite data on two NASA missions. The themes for the student projects were ICESAT Land, ICESAT Water, the ICESAT 2 mission and the GRACE mission. The students also conducted space science hands-on activities led by TSGC staff and *LiftOff* alumni teachers. At the conclusion of their internship experience, the students visited the McDonald Observatory in far west Texas.

TSGC personnel participated in several elementary, middle and high school programs both short term and long term in 2013. Programs for students reached 5,826. They are: *Boy Scout Jamboree*, *Bridgepoint Elementary School*, *Chisholm Trail Elementary School*, *Eanes Elementary School*, *McNeil High School STEM Academy*, *Expanding Your Horizons*, *LiftOff Alumni* teacher-led student programs, and the *Texas School for the Blind and Visually Impaired*. Programs with a combination of students, teachers, and parents reached 2,532 individuals. These activities included *Briscoe Elementary Science Night*, *Deer Creek Science Night*, *Earth Science Week Career Fair*, *Fern Bluff Elementary*, *Giddens Elementary*, *RGVSA Site Visits*, *Springhill Elementary Science Night*, and *Steiner Ranch Elementary School*. In total, these activities reached over 8000 students, teachers, and parents.

TSGC partners and collaborates with numerous organizations each year. In these collaborations, we have trained informal educators, distributed materials to the general public, and conducted standards-based educational activities for students, parents, and the general public. In 2013-2014, TSGC hosted and participated in the following informal education activities: *Austin Nature and Science Center*, *Texas Agri-life Extension Service*, *Women in Astronomy Outreach Event*, *City of Austin Museum Day*, *Boys and Girls Clubs*, and *World Space Day*. These activities reached more than 700 individuals.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

Student data and Longitudinal Tracking:

Total awards =68; Fellowship/Scholarship = 68, 29 of the total award represent underrepresented minority F/S funding. During the FY13 program year, 8 students are pursuing advanced degrees in STEM disciplines, 5 are seeking STEM employment, 9 accepted STEM positions at NASA

contractors, 12 accepted STEM positions in industry, 3 accepted positions at NASA, 1 accepted a STEM position in K-12 academia, 5 accepted STEM positions in academia, and 18 went on to positions in non-STEM disciplines. The remaining students who received Space Grant awards have not yet received their degrees.

Since 2006: 95% of students have been successfully tracked and taken their next step. For all the students that were significantly supported and tracked 30% are pursuing advanced degrees in STEM disciplines, 40% accepted STEM positions at NASA , NASA contractors or industries and 14% accepted STEM positions in academia. Of these students tracked, 27% are minorities and 39% are women.

Minority Serving Institution Collaborations: The Education and Outreach staff of TSGC supported programs and proposals by affiliates, institutions, and partners that serve underrepresented and underserved populations. Minority Serving Institution involvement in our programs and proposals is one of our main focuses. Our Fellowship / Scholarship Selection Committee is comprised of two members from MSIs (U. of Texas El Paso and Texas A&M Kingsville) and one member from Texas Tech.

We continue to advertise our programs with as many of the student chapters of minority and women student organizations at our affiliates as we can find contact information for. We work via the internet and through our affiliate representatives. We have identified a number of student chapters at affiliate institutions. They include 18 chapters of the National Society of Black Engineers (NSBE), 18 chapters of the Society of Hispanic Professional Engineers (SHPE), 2 chapters of Pi Sigma Pi Minority Academic Engineering Society, and 17 chapters of the Society of Women Engineers (SWE).

We continue to partner with Citizens Schools, a nationwide organization that works with middle schools to expand the learning day for children in low-economic communities. Our collaboration with the Rio Grande Valley Science Association (RGVSA) provided NASA resources to young Hispanic girls and “Girls in Science” camp co-sponsored by TSGC and RGVSA and has expanded programs for teachers, students and collaborations in the underserved area of Texas along the Mexico border. Programs with the Texas School for the Blind and Visually Impaired offered NASA materials to students, staff, and teachers who serve this disabled and often underrepresented audience.

NASA Education Priorities

In this section, we state a NASA Education Priority in italics, followed by a brief description of how we focus on that priority in our programs.

Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.

- TSGC provides support for the NASA High School Internship Program at the UT Center for Space Research. Students are mentored by project scientists and work on analyzing NASA satellite data.
- Texas Space Grant *Design Challenge* Program - matches undergraduate student design teams from TSGC member institutions with real-world space related design projects provided by the NASA JSC community.
- TSGC supports two to three smaller higher education projects each year.
- TSGC provides student support NASA Internships and NASA Academies.

Diversity of institutions, faculty, and student participants.

- During the past year TSGC has continued to engage diverse audiences through student programs, teacher professional development, and with institutions who serve diverse populations. We submitted a midterm Consortium Improvement Plan in early 2013 that addressed how we planned to increase our minority involvement in our programs. Data cited elsewhere in this report show that these efforts have been successful.
- We have partnered with The National Society of Black Engineers
- Out of 41 TSGC academic affiliates, 21 are Minority Serving Institutions. This reflects the changing demographics of the Texas academic population.

Engage middle school teachers in hands-on curriculum enhancement capabilities -- through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines.

- Each summer, TSGC conducts a weeklong summer teacher workshop, *LiftOff*, at NASA JSC. *LiftOff* emphasizes STEM learning experiences by incorporating a space science theme supported by NASA missions for middle school teachers. This train-the-trainer workshop reaches many teachers who are not able to physically attend *LiftOff* as each attendee trains a minimum of 20 teachers after returning to their home district and most train 50 additional educators.
- TSGC provides \$15K K-12 Education grants, matched by the recipient's home institution. These grants focus on developing materials for K-12 educators.
- NASA JSC has merged the Middle School Aerospace Scholars program with the *LiftOff* Summer Institute for 2014.
- We have sponsored, conducted, and leveraged multiple teacher professional development short term activities described earlier in this report,

Summer opportunities for secondary students on college campuses -- with the objective of increased enrollment in STEM disciplines or interest in STEM careers.

- We participate annually in the Texas Science and Engineering Festival, a publically offered weekend of STEM booths, hands-on activities and educational programs.

- We operate the NASA ROSES Summer Internship Program at the University of Texas Center for Space Research - This competitive program offered 11 high school students the opportunity to work beside scientists and engineers in a university setting on four NASA climate education and analysis satellite missions while also conducting space science hands-on activities led by TSGC staff and *LiftOff* alumni teachers.
- We conduct the elementary and high school short and long term highlighted earlier in this report.

Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.

- 5 of our 41 academic affiliates are community colleges.
- The affiliate representative from San Jacinto College is now heading the TSGC Minority Serving Institution Activities Council (MSIAC). The MSIAC consists of affiliate representatives from the 21 MSI TSGC affiliates. The purpose of the MSIAC is to advise the TSGC Board of Directors and Director about how to better involve and serve the needs of MSI students and institutions. The chair of the MSIAC is a member of the TSGC Board of Directors.

Environmental Science and Global Climate Change – research and activities to better understand Earth's environments.

- We annually participate in the Earth Science Week career fair.
- We operate the NASA ROSES Summer Internship Program at the University of Texas Center for Space Research - High school students work beside university scientists and engineers on four NASA climate education and analysis satellite missions. These students also participate in space science hands-on activities led by TSGC staff and *LiftOff* alumni teachers.

Enhance the capacity of institutions to support innovative research infrastructure activities -- to enable early career faculty to focus their research toward NASA priorities.

- Through our competitive New Investigator Program, we provide research start-up funding of \$10K, matched by the recipient's home institution, to between 1-5 new faculty members at affiliate institutions each year. During 2013-2014, we provided three such grants as discussed earlier in this report.

IMPROVEMENTS MADE IN THE PAST YEAR

We were successful in our efforts to increase Minority and Female participation in our programs. As noted earlier, in 2013-2014, we directly funded 68 students in our Fellowship/Scholarship programs (44 % were female and 51% were underrepresented minorities).

We have one new academic MSI affiliate, the University of St. Thomas. In addition, we have two new non-profit affiliates that are minority focused, the Rio Grande Valley Science Association (the lead organization for the Texas SoI program) and the National Society of Black Engineers. Just over half of our academic affiliates are minority serving institutions (21 out of 41).

Because of our SoI partnership with the Rio Grande Valley Science Association (RGVSA), the RGVSA became a member of Texas Space Grant. Subsequently, TSGC staff, working with RGVSA personnel, provided NASA resources to 200 pre-service and in-service teachers along the Texas/Mexico border of south Texas. While 75% of the teacher participants were minority, 80% of the students they reach are Hispanic and qualify for free or reduced lunch. This program involved two camp strands – Girls in Science and Underwater Robotics. The camps were designed for girls in Grade 4-9.

TSGC's focus on STEM programs at local schools for science days and family science nights gave priority to schools serving underrepresented and underserved audiences reaching over 1,000 students. Ten classroom teachers from the Rio Grande Valley that reach underrepresented and underserved audiences were selected for the *LiftOff* Summer Institute. This selection was designed to help bridge the *SoI* programs and classroom education. Collaboration with the Texas School for the Blind and Visually Impaired led to a multi-day space camp for main-streamed visually impaired students.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

TSGC is structured to provide strong management input and oversight by representatives of its affiliate institutions. We have 54 total affiliates. Most affiliate representatives play a vital role in defining Consortium operations, goals, and funding distribution and are provided with many avenues for participation in consortium management and programs. They can stand for election to the Board of Directors (BOD), be a member of one or more consortium committees, advertise and encourage students to apply for our scholarships, fellowships, and NASA internships, distribute information about funding opportunities, review scholarship / fellowship applications, review proposals, assist in tracking program participants, and help to recruit and keep students involved in STEM activities. Below we list all TSGC affiliate members (**MSIs** are indicated by boldface type).

Four Year University Affiliates – 36

Angelo State University, Baylor University, Lamar University, **Prairie View A&M University**, Rice University, Southern Methodist University, **Sul Ross State University**, Tarleton State University, Texas A&M University, Texas A&M University Commerce, **Texas A&M University Corpus Christi**, **Texas A&M International University**, **Texas A&M University Kingsville**, Texas Christian University, **Texas Southern University**, **Texas State University – San Marcos**, Texas Tech University, Trinity University, University of Dallas, **University of Houston**, **University of Houston Downtown**, **University of Houston Clear Lake**, University of North Texas, **University of Texas Pan American**, University of Texas at Arlington, University of Texas at Austin, University of Texas at Dallas, **University of Texas El Paso**, UT

Health Science Center Houston, **UT Health Science Center San Antonio**, UT Medical Branch Galveston, **University of Texas San Antonio**, UT Southwestern Medical Center, University of Texas at Tyler, **University of Texas at Brownsville**, **University of St. Thomas**.

Community College Affiliates – 5

San Jacinto College, Houston Community College, Austin Community College, El Paso Community College, McLennan Community College

Industry / State Agency / Non-profit Affiliates – 13

Austin Planetarium, Bob Bullock State History Museum, Don Harrington Discovery Center, Lockheed Martin, Office of the Governor, Southwest Research Institute, Texas Higher Education Coordinating Board, United Space Alliance, University Space Research Association, Girlstart, Texas Medical Center, Rio Grande Valley Science Association, National Society of Black Engineers.

PARTNERSHIPS AND COLLABORATIONS

In 2013-2014, TSGC and NASA JSC personnel continued to expand the scope and reach of the *Design Challenge* while simultaneously making it more cost-effective. TSGC, working with NASA JSC personnel, is developing a Texas-focused pilot program in which NASA engineers (just from JSC in the pilot program) will provide problems and mentors for engineering capstone design teams, and will, in return, receive the results of the student design efforts. The goal is to make problems of importance to NASA available to engineering capstone design classes at universities across the nation. The program has its roots in the TSGC Design Challenge and in ongoing capstone design collaborations between JPL and the U. of Texas at Austin. It is anticipated that through these efforts, when expanded across NASA and among the Space Grant Consortia, the program will facilitate the identification and formation of groups of experts (Interest Clusters) in technical areas of importance to NASA.

Another NASA JSC-TSGC collaboration is the NASA JSC Career Exploration Program. This program is based on the TSGC *Design Challenge Showcase* held near the end of each semester at NASA JSC. In this collaboration, Houston area high school students from area minority campuses attend the *Design Challenge Showcase*. The goal is to show high school students "what college has to offer" by viewing and interacting with talented and enthusiastic university / *Design Challenge* participants.

Other partnerships and collaborations in 2013-2014 include twelve local schools surrounding the greater Austin area including *Fern Bluff Elementary*, *Wiley Middle School*, *Austin Girls School*, and the *STEM Center for Excellence* where we conducted teacher and student workshops. We partnered with 9 school districts in the Rio Grande Valley (Valley View Independent School District (ISD), Pharr-San Juan-Alamo ISD, Edinburg ISD, Harlingen ISD, McAllen ISD, Donna ISD, Mission ISD, Weslaco ISD, and Brownsville ISD) and the *Boys and Girls Clubs* through this south Texas region to provide NASA resources, teacher professional development, and

support for student camps during the Summer of Innovation program. Our partnership with the *Texas School for the Blind and Visually Impaired (TSBVI)* led to a multi-day space camp with visually impaired students from across the state. *TSBVI* transported youth to Austin for the camp and housed them in dorm facilities.